

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Official Action dated November 8, 2005. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 1-19 are under consideration in this application. Claim 1 and 9-19 are being amended, as set forth in the above marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim Applicants' invention.

The claims are being amended to correct formal errors and/or to better disclose or describe the features of the present invention as claimed. All the amendments to the claims are supported by the specification. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Prior Art Rejection

Claims 1 - 8 were rejected under 35 U.S.C. §103(a) as being unpatentable over US Pat. No. 6,721,273 to Lyon et al. (hereinafter "Lyon'273") in view of US Pat. No. 5,764,641 to Lin (hereinafter "Lin"), and claims 9 - 10 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lyon'273 in view of US Pat. No. 6,324,169 to Roy (hereinafter "Roy"). Claim 11 was rejected under 35 U.S.C. §103(a) as being unpatentable over US Pat. No. to Jorgensen (6,452,915) in view of US Pat. No. 6,717,912 to Lemyre (hereinafter "Lemyre"); and claims 12-13 were also rejected under 35 U.S.C. §103(a) as being unpatentable over US Pat. No. 5,892,924 to Lyon et al. (hereinafter "Lyon'924") in view of Lyon '273 and Lin. Further, claims 14-17 were rejected under 35 U.S.C. §103(a) on the grounds of being unpatentable over Roy in view of an article by Comer (hereinafter "Comer") and US Pat. No. 6,279,140 to Slane (hereinafter "Slane") and Lin. Finally, claims 18-19 were rejected under 35 U.S.C. §102(b) as being anticipated by US Pat. No. 5,898,687 to Harriman (hereinafter "Harriman"). The prior art reference of Lyon et al. (5,892,924) was cited as pertinent to the invention. These rejections have

been carefully considered, but are most respectfully traversed in view of the newly submitted claims, as more fully discussed below.

The packet data transfer method for an IP (Internet Protocol) network or an MPLS (Multi-Protocol Label Switching) network of the invention (for example, the embodiment depicted in Figs. 3-4), as now recited in claim 1, comprises the steps of: retaining flow identifier 42 data for identifying data to be processed and control code identifier 44 data for controlling the processing for each of a plurality sets of packet data 1-1 in the box 43-1, 1-2 in the box 43-2 (p. 24, lines 3-11), in a packet data transfer apparatus 100 (Fig. 1) having a plurality of Input and Output ports 1-1...1-N; receiving the plurality of sets of packet data 1-1 in the box 43-1, 1-2 in the box 43-2 transmitted via respective data packets converted from a meaningful frame or slice of audiovisual data (e.g., layered data (1) in the box 43; *“The layered data (1), or 43, is thus divided into 43-1 and 43-2 before converted into IP packet data.”* P. 25, lines 4-6), said data packets provided with said flow identifier data and control code data 60, 61 (p. 25, lines 14-15); and in discarding packet data identified by the flow identifier data 55, 56 upon congestion in the packet data transfer apparatus 100, performing discard initiation or termination based on said control code data 60, 61. The discard is initiated at an initial data packet (with a control code “0xD” in Fig. 4) of the meaningful frame or slice of audiovisual data (1) rather than at a middle data packet (with a control code “0xC” in Fig. 4) of the meaningful frame or slice of audiovisual data (1) (*“The packet discard is initiated at packet data including the control code data of 0xD....When the discard flag is on and the amount of data in the buffer 14 falls below a discard termination point, the transmission to the buffer 14 is initiated from packet data including the control code data of 0xD. That is, even when the amount of data in the buffer 14 reaches/exceeds the discard initiation point 1, the discard is held back as long as packet data including the DS value of 0x1C is received.”* p. 37, last line to p. 38, line 10). Claims 9-17 recite the same discard feature.

Similarly, *“the discard is not terminated as long as packet data including the DS value of 0x2C is received, and the discard is terminated after the reception of IP packet data with 0x2D.”* (p. 38, lines 22-24)”

“The present invention achieves the foregoing objects by dividing meaningful data structures such as image frames and slices for IP packet transmission, and when packet discard

is required due to transmission network congestion, initiating/terminating packet discard in accordance with the beginning of meaningful data (image frame or slice) rather than in the middle of the meaningful data (p. 5, line 20 to p. 6, line 2)."

In accordance with the present invention, an identifier is used that indicates whether a packet is an initial packet or an intermediate packet of a meaningful piece of data. Thus, the packet discard operation is not initiated or terminated just because a congestion is detected. Upon detection of a congestion, the packet discard operation is initiated only from an initial packet of meaningful visual data; no discard operation is initiated as long as the identifier indicating ongoing data of the meaningful piece of data is being detected. Therefore, the invention prevents discarding packet data related to the packet data that has already started transmitting. Furthermore, upon detection of disappearance of congestion, the discard operation is terminated from the next initial packet of the next meaningful visual data; the discard operation is continued as long as the identifier indicating ongoing data of the currently-transmitted meaningful piece of data is being received. Therefore, the invention prevents transmitting wasteful packet data related to the packet that has already been discarded.

The invention as recited in claim 18 is directed to a packet data duplicating and distributing method comprising the steps of: retaining flow identifier data 55, 56 for identifying data to be duplicated and control code data 60, 61 for controlling the duplication processing for each of a plurality of sets of packet data transmitted via respective data packets converted from a meaningful frame or slice of audiovisual data; and when packet data provided with said flow identifier data 55, 56 and control code data 60, 61 is received, and the packet data identified is to be duplicated, performing duplication initiation and duplication termination on the packet data having said retained flow identifier data 55, 56 based on said control code data 60, 61. The duplication is initiated at *an initial data packet* (with a control code "0xD" in Fig. 4) of the meaningful frame or slice of audiovisual data (1) rather than at *a middle data packet* (with a control code "0xC" in Fig. 4) of the meaningful frame or slice of audiovisual data (1) (*"The present invention also achieves the foregoing objects by initiating packet duplication at the time of data multicast distribution in accordance with the beginning of meaningful data such as image frames and slices rather than initiating the duplication in the middle of the meaningful data. (p. 6, line 3-7)."*) Claim 19 recites the same duplication feature.

As the discard or duplication is initiated in accordance with the beginning of meaningful data (image frame or slice) rather than in the middle of the meaningful frame or slice of audiovisual data, the bandwidth of transmission channel is effectively utilized, or the disturbance in the reproduction of visual or audio broadcast data is prevented (p. 65, line 22 to p. 66, line 19).

The invention solves the problems of the prior art: (1) if some of image frame data or the like is discarded, even though the entire image-frame data including the discarded packet becomes invalid, the invalid packets continue to be transmitted after the packet discard, thereby wasting the transmission channel bandwidths; and (2) in the case of multicast distribution, starting duplication in the middle of image-frame data causes a problem of distributing invalid data until the top of the next frame data (p. 3, line 8 to p. 4, line 5). As such, the invention effectively utilizes transmission channel bandwidth and prevents disturbance during reproduction of visual and/or audio program data (p. 65, line 22 to p. 66, line 19).

Applicants respectfully submit that none of the cited prior art references teaches or suggests “initiating discard or duplication at an initial data packet of the meaningful frame or slice of audiovisual data rather than at a middle data packet of the meaningful frame or slice of audiovisual data” according to the present invention.

As admitted by the Examiner (p. 2, 2nd to the last paragraph of the outstanding Office Action), Lyon’273 fails to teach “initiating discard or duplication at a beginning of meaningful data rather than in a middle of the meaningful data”. Lin was relied upon by the Examiner to compensate for the deficiencies of Lyon’273.

In contrast, Lin uses a flag (CLP) indicating a high or a low level of priority depending on the importance of data is set, and data transmission is controlled in accordance with the thus set flag. In this system, because only the priority of data is considered, the discard of low-priority data is initiated immediately upon detection of congestion. In this case, if several packets/pieces of meaningful data have already been transmitted, it would be impossible to reproduce necessary meaningful visual data with only the packets that have been transmitted. Specifically, as shown in steps 202 to 204 of Fig. 4 of Lin, when cells have been received and the cue of the port has exceeded a threshold value, the cells are immediately discarded (step 204). Therefore, when there is a state of congestion, cells of low-priority that have been received are discarded regardless of whether or not related cell data has been previously transmitted. As such,

Lin initiates discard or duplication at a middle data packet of the meaningful frame or slice of audiovisual data, rather than just at an initial data packet of the meaningful frame or slice of audiovisual data as the invention.

Lin's EPD (Early Packet Discard) scheme basically discards on a packet basis, if congestion takes place in a system, i.e., almost the whole packet except the end-of-packet cell (*"once a cell of a packet has been discarded for any reason, discards all of the remaining cells of the packet except the end-of-packet cell"* Abstract; col. 3, lines 17-23), rather than discarding on a meaningful frame or slice of audiovisual data basis (including a plurality of packets) by labeling each packet of the meaningful frame or slice of audiovisual data as *"an initial data packet"* or *"a middle data packet"* then only starting/terminating a discard from *"an initial data packet"* as in the present invention.

In addition, Lin's I-TPD (Integrated Tail Packet Discard) scheme discards remaining cells in a packet except the end-of-packet cell, if part of a cell in the packet is discarded (col. 3, lines 32-36). Lin's I-TPD scheme simply does not discriminate *"an initial data packet"* from *"a middle data packet"* of a meaningful audiovisual data and then carry out discard accordingly.

Thus, Lin does not teach or suggest starting/terminating the discard at an initial data packet of the meaningful frame or slice of audiovisual data rather than at a middle data packet of the meaningful frame or slice of audiovisual data. Lin's techniques simply do not even detect the beginning of such a frame or slice of audiovisual data. The other cited references fail to compensate for the deficiencies of Lyon'273 and Lin.

Applicants contend that the cited prior art references and their combinations fail to teach or disclose each and every feature of the present invention as recited in independent claims 1 and 9-19. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

Conclusion

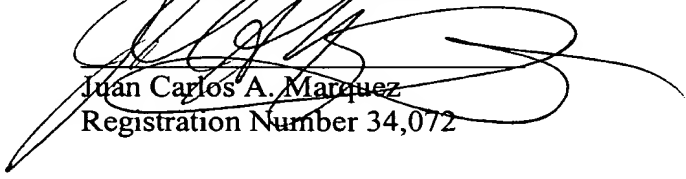
In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art reference upon which the rejections in the Office Action rely, Applicants respectfully contend that the prior art references cannot anticipate

the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and telephone number indicated below.

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